THE MIGRATION OF HUMPBACK WHALES *MEGAPTERA NOVAEANGLIAE* IN EAST AUSTRALIAN WATERS

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The east Australian Humpback Whale, *Megaptera novaeangliae*, stock, severely depleted by 1962, is now recovering at approximately 9.7% per annum. Available evidence indicates that shorebased whaling did not affect migration patterns in east Australia. The stock disperses in the sheltered waters of the Great Barrier Reef to breed although some calving occurs at higher latitudes. Future studies may determine if the breeding area for this stock includes the Coral Sea east of the Great Barrier Reef. ☐*Humpback Whale, Megaptera novaeangliae, migration, east Australia.*

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Humpback whales were exploited from five locations in east Australia during this century (Table 1). After the Second World War, when the re-establishment of Australian shore stations was under consideration, fishermen and other interested persons were requested to report whale sightings (Anon., 1948). Reports from east Australia indicated large numbers of Humpback Whales at 23–27°S during July, August and September. Specific site reports included Cape Capricorn, Lady Elliott Island, Double Island Point and Stradbroke Island (Colwell, 1969).

During the final phase (1952–62) of Humpback Whale exploitation in east Australia, extensive biological data, including timing of northern and southern migrations in the vicinity of 27–28°S, were obtained (Chittleborough, 1965). However, the routes and timings of migrations at lower latitudes were not determined.

Recoveries of "Discovery" tags indicated that Humpback Whales marked in east Australia tended to return after feeding in Antarctic waters although small rates of interchange within Area V (130°E–170°W) occurred between east Australia and New Zealand (Dawbin, 1964) in addition to an isolated exchange from Fijian waters (17°40'S, 178°55'E). Information concerning movement during the northern migration in a single season was also obtained. A Humpback Whale marked at St George Head, N.S.W. (35°11'S, 150°45'E) was captured at Tangalooma (27°11'S, 153°23'E) six days later (Robins, 1955) and another marked in the Cook Strait, New Zealand (41°21'S, 174°25'E) was captured at Tangalooma twenty days later (Dawbin, 1964). In addition to movements within Area V a small number of interchanges with Area IV (70°E–130°E) were demonstrated (Chittleborough, 1965).

When the Southern Hemisphere humpback whaling industry collapsed in 1962–63 the Area V population was estimated to be <5% of the original population of 10,000 (Chittleborough,1965; Chapman,1974). During a whale sighting cruise through the known (Omura, 1953) Area V feeding grounds between January and March 1973 concern was expressed because only seven Humpback Whales were sighted (Machida,1974). It was not until the early 1980s that the first tentative accounts of recovery in the east Australian Humpback Whale population were reported (Paterson,1980,1981).

In the post-whaling era Humpback Whale migrations in east Australia have been assessed by direct observation (Bryden,1985; Paterson and Paterson,1984,1989; Simmons and Marsh,1986) and photo-identification of individuals (Kaufman, Smultea and Forestell,1987). The results of shore-based surveys at Point Lookout (27°26'S, 153°33'E) are discussed in this paper together with reports from other locations in east Australia.

POINT LOOKOUT SURVEY

Point Lookout is the northeastern headland of North Stradbroke Island and was within the operational range of Tangalooma whalechasers

TABLE 1. East Australian Humpback Whale exploitation since 1900.

LOCALITY	PERIOD	CATCHES	REFERENCE
Twofold Bay 37°05'S; 149°54'E	until 1929	Numbers not recorded (small relic industry)	Davidson, 1988
Jervis Bay 35°03'S; 150°45'E	1912-1913	?400-600 (12,500 barrels of oil)	Dakin, 1934
Norfolk Island 29°01'S; 167°58'E	until 1927 1956-1962	Numbers not recorded 884	Dakin, 1934 Chittleborough, 1965
Byron Bay 28°37'S; 153°38'E	1954-1962	1,146	Chittleborough, 1965
Tangalooma 27°11'S; 153°23'E	1952-1962	6,277	Chittleborough, 1965

(Fig.1). Sightings of Humpback Whales made on a weekly basis from a 67m high position during 1987–90 are shown in Figs 2,3 and 4. Observation methods were as described by Paterson and Paterson (1984, 1989). The peak of the northern migration occurred between late June and late July respectively in those years. In the same vicinity in 1961 the peak occurred between the last two weeks of June and the first week of July (Chittleborough, 1965). Dawbin (1956) suggested that undetermined Southern Ocean climatic factors may affect the onset of the northern migration with resultant variations in the timing of the annual peaks. The sighting rates of northbound Humpback Whales passing the east Australian shore-stations between June

TABLE 2: Northbound Humpback Whales seen per 100 hours at 27°S, on the east Australian coast in 1961-1962 and 1987-1990.

PERIOD	RELATION TO WHALING OPERATIONS	SIGHTINGS /100 HRS
12/6/1961-6/8/1961	penultimate whaling year	88.2
18/6/1962-5/8/1962	final whaling year	38.6
15/6/1987-5/8/1987	25 years post-whaling	65.3
11/6/1988-3/8/1988	26 years post-whaling	70.7
11/6/1989-3/8/1989	27 years post-whaling	78.0
11/6/90-5/8/90	28 years post-whaling	78.8

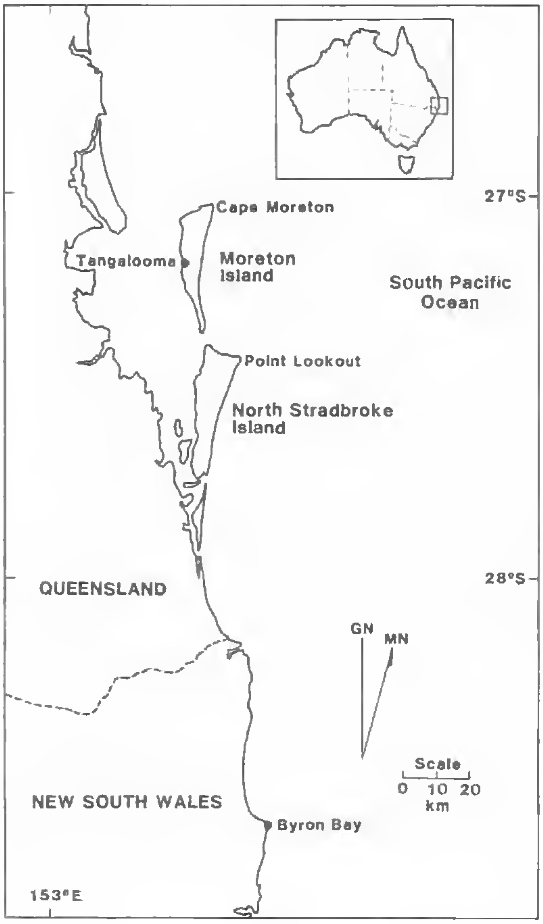

FIG. 1. Location map of former east Australian whaling stations (Table 1) nearest to Point Lookout.

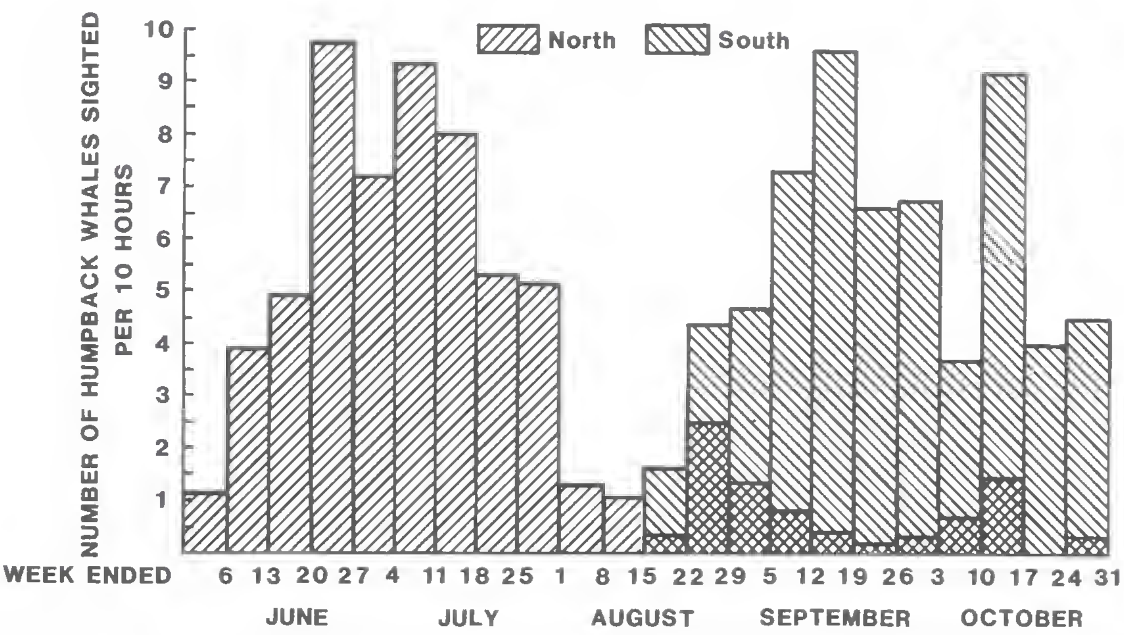

FIG. 2. Humpback Whale sightings from Point Lookout, per 10 hrs of observation, during 1987.

and early August in 1961–62 were used as an index of population decline (Chittleborough, 1965) and now may be used as an index of recovery (Table 2). The sighting rates for 1987-88 and 1988–89 increased by 8.2% and 10.3% respectively, whereas the rate for 1989–90 increased by only 1.0%. That low rate is considered to result from the "lateness" of the northern migration in 1990 (Fig.4). Although substantial numbers of northbound Humpback Whales may have passed Point Lookout after the first week of August in 1990, observations were

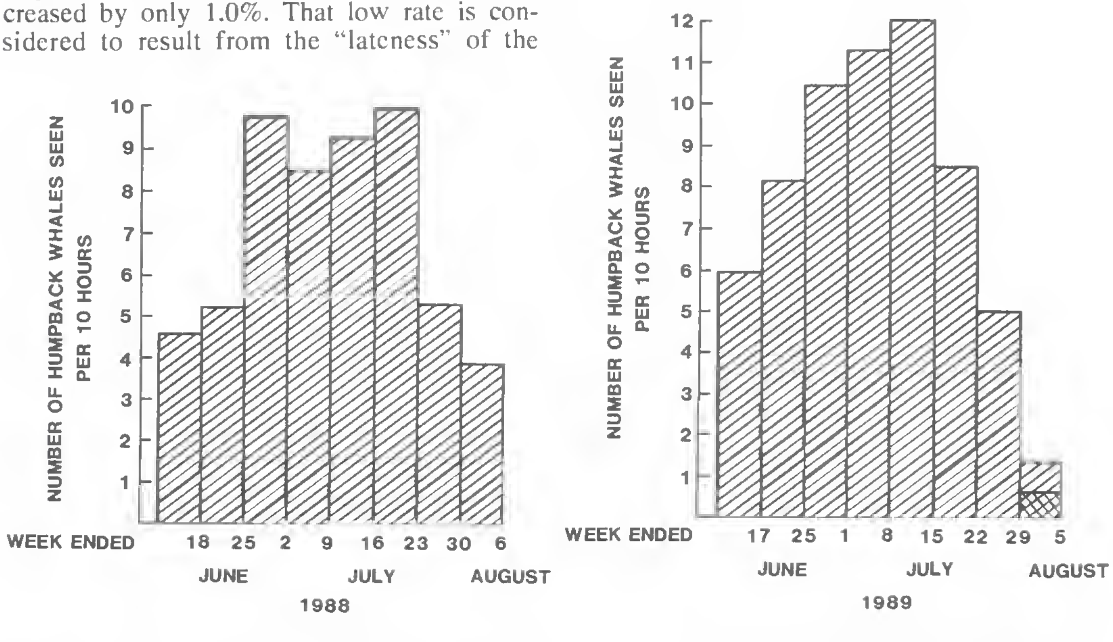

FIG. 3. Humpback Whale sightings from Point Lookout, per 10 hrs of observation, during 1988 and 1989

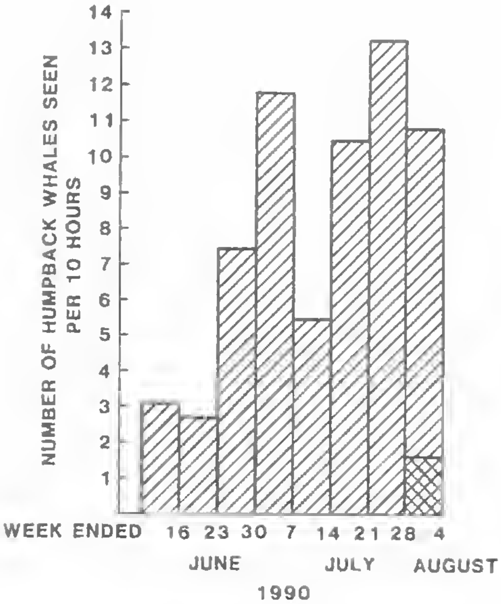

FIG. 4. Humpback Whale sightings from Point Lookout, per 10 hrs of observations, during 1990.

terminated then to conform with the data collections in 1988-89 (Fig.3).

The extended observations in 1987 confirm the findings of Chittleborough (1965) that the northern migration continues at least until late October, albeit at a reduced rate. In 1987, 15.5% of northbound Humpback Whales passed Point Lookout between late August and October. The Antarctic pack ice does not reach its northern limit until November (Slijper, 1962) and presumably "late" northbound Humpback Whales obtain adequate nutrition because those observed at close quarters off Point Lookout in October 1982 were in prime condition (Paterson,1983).

The lack of a distinct peak during the southern migration in late August, September and October was evident in 1987 and is consistent with the findings of Chittleborough (1965) and Paterson (1984). Small numbers of southbound Humpback Whales are sighted from Point Lookout during mid-summer including two seen on 27 January 1985.

During annual surveys at Point Lookout during 1978-89 almost 1,500 Humpback Whale groups were observed. Whenever possible, their route in relation to Boat and Flat Rocks was noted (Fig.5). During the northern migration 87.5% passed east of both rocks while 3.5% passed east of Boat Rock and west of Flat Rock. During the

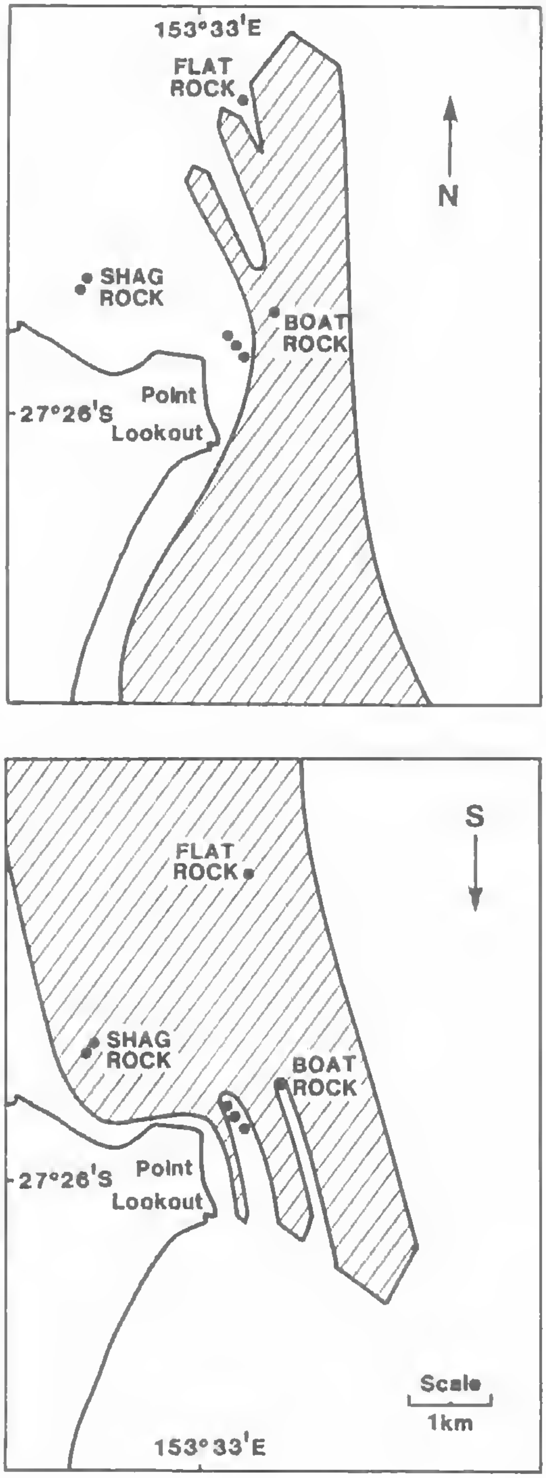

FIG. 5. Maps of the courses taken by Humpback Whales when migrating northwards (upper) and southwards (lower) past Point Lookout (1978-1989).

southern migration 25% passed east of both rocks while 47.5% passed east of Boat Rock and west of Flat Rock. No appreciable alteration in those patterns was noted in any year during 1978-89. The different routes may result from the geographic relationship of North Stradbroke and Moreton Islands (Fig.1). Northbound Humpback Whales generally pass Point Lookout on a northnortheast course until they reach Flat Rock when they move northwest towards Moreton Island. Southbound whales which pass close to Moreton Island may approach Point Lookout from the westnorthwest. They are frequently seen near Shag Rock (Fig.5) as they move east towards Boat Rock before resuming a southbound course.

REPORTS FROM OTHER EAST COAST LOCATIONS

During 1979-86, annual requests for information concerning Humpback Whale migrations were published in *Australian Fisheries* a journal circulated *inter alia* to holders of Australian commercial fishing licences. The response was generous and included reports from amateur and commercial fishermen, lighthouse keepers, surveillance and tuna-spotting pilots and the general public. A comprehensive sighting network developed and many data resulted (Figs 6,7). A survey of this type, which relies on public cooperation, may reflect bias towards areas of high human density (Simmons and Marsh, 1986) and will not result in reports of all sightings (Paterson and Paterson, 1984). Nevertheless, it established the broad pattern of Humpback Whale migration in east Australia.

The peak of the northern migration from the Antarctic feeding grounds occurs during June/July and includes small numbers which pass eastwards through Bass Strait. Although northbound Humpback Whales generally adopt a direct course there are records of some entering bays and estuaries between 27°S and 42°S during June/July, including the Derwent Estuary, Tasmania; Corio Bay, Victoria; Broken Bay, N.S.W. and Moreton Bay, Queensland.

Dawbin (1966) noted when Humpback Whales reach a coastal shore they tend to remain close to it and those findings were confirmed by Bryden (1985) during aerial surveys off the southern Queensland and northern N.S.W. coasts. However, after the migration stream passes Breaksea Spit (24°36'S, 153°20'E) at the northern end of Fraser Island it enters the sheltered waters of the Great Barrier Reef and disperses widely between the outer Barrier and the coast, which inclines to the northwest. Northward movement slows and sightings peak in August with only small numbers reaching latitudes lower than 15°S. The latitudinal and monthly concentrations are similar to those recorded in other Southern Hemisphere breeding locations (Townsend, 1935). Calving has been witnessed at 18–19°S inside the Great Barrier Reef but also occurs at higher latitudes as Humpback Whales accompanied by new born calves have been seen migrating northwards along the southern Queensland coast (Paterson and Paterson, 1989). A dedicated survey, using photo-identification (Kaufman et al.,1987), may demonstrate the movements of individual Humpback Whales in the Great Barrier Reef region.

Small numbers of Humpback Whales commence their southern migration in late July (Figs 3,4) but the majority leave the Great Barrier Reef region between mid-August and mid-October. The migration pattern in the Fraser Island region differs from the northern migration in that large numbers of Humpback Whales pass west of Breaksea Spit and enter Hervey Bay. This phenomenon has resulted in the development of a large whale-watching industry in recent years as the public has the opportunity to observe Humpback Whales at close quarters in sheltered waters at a predictable time of the year. The geographic relationship of Breaksea Spit and Fraser Island to the mainland may explain in part why Humpback Whales enter Hervey Bay. A similar, although less dramatic, course variation during the southern migration compared with the northern migration in the Point Lookout region (Fig. 5) has already been discussed.

By November/December most Humpback Whales have left the east Australian coast for the Antarctic feeding grounds although small numbers have been reported at relatively low latitudes in January/February (Paterson, 1987). Dawbin (1966) noted that southbound Humpback Whales captured at Great Barrier Island, New Zealand (36°S) invariably showed evidence of recent feeding and there is evidence to suggest occasional Humpback Whale feeding activity at similar latitudes on the east Australian coast (Paterson,1987; Ellis,1989).

DISCUSSION

The combination of legal and illegal catches of

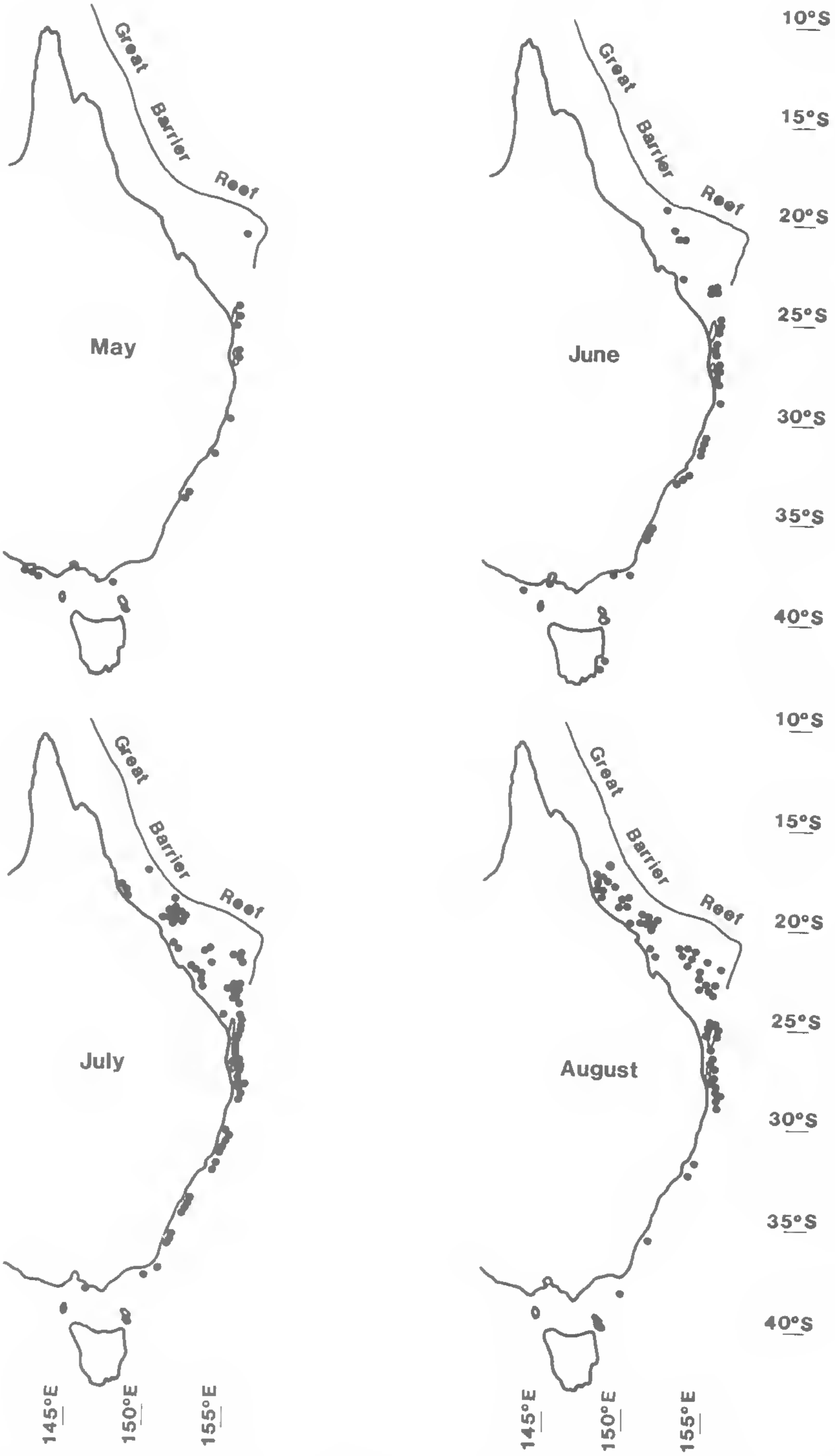

FIG. 6. Spatial distribution of Humpback Whales in east Australian waters, May-August, 1978–1989. Each marking represents one or more Humpback Whale Groups seen during a particular month in one or more years.

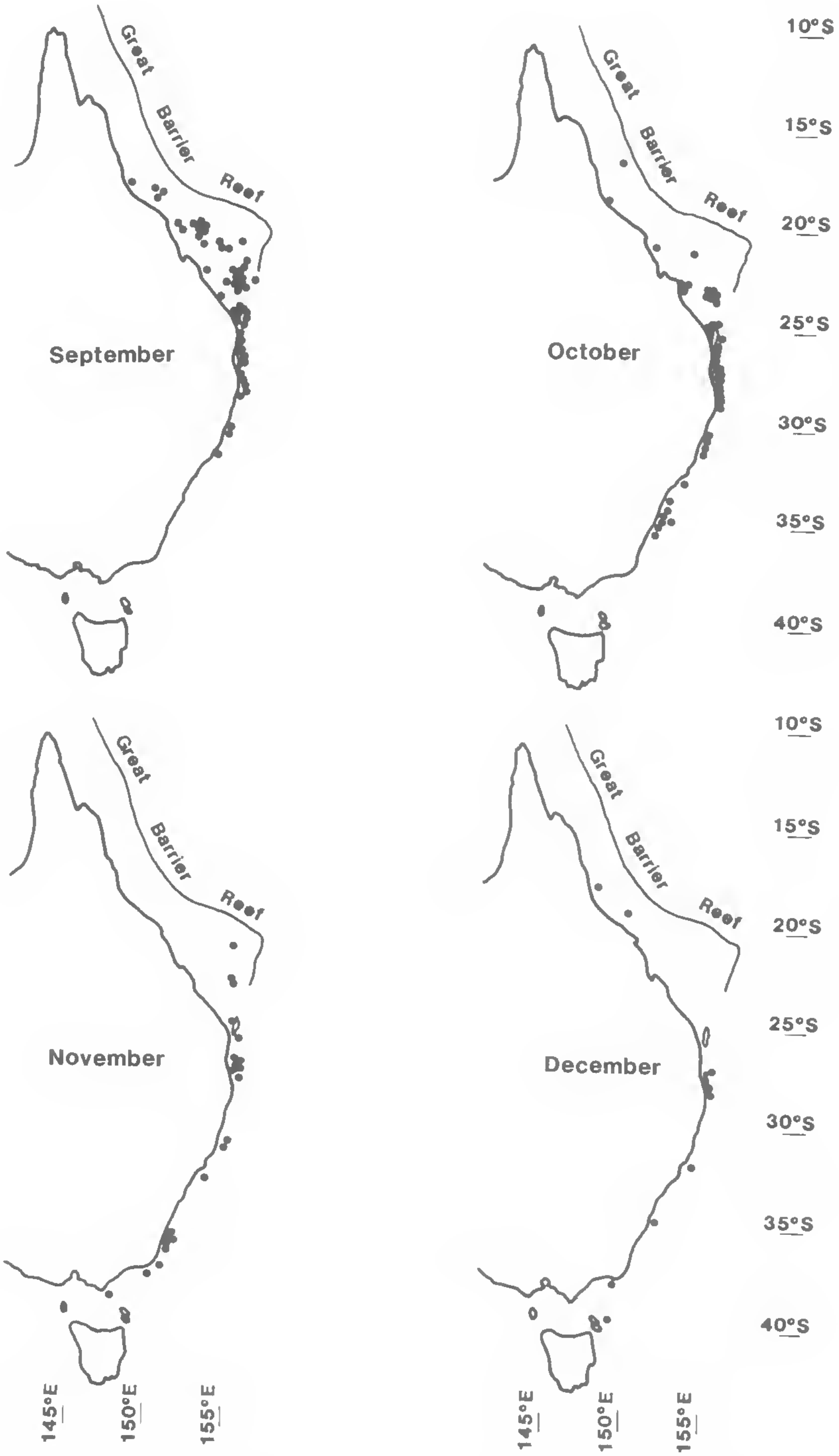

FIG. 7. Spatial distribution of Humpback Whales in east Australian waters, September-December, 1978–1989. Each marking represents one or more Humpback Whale Groups seen during a particular month in one or more years.

Area V Humpback Whales during 1952–63 resulted in a population decline extreme even by the standards of modern whaling (Tonnessen and Johnsen, 1982). The paucity of incidental sightings in the post-whaling decade prompted conjecture that Humpback Whales deliberately avoided the regions of the former east Australian shore-stations (Anon., 1976). However, similarity of the migration patterns for 1961 (Chittleborough, 1965) and 1987 (Fig.2) suggests that exploitation of Humpback Whales in east Australia did not affect their migratory behaviour.

Although the sheltered waters of the Great Barrier Reef are a major destination for those Humpback Whales which migrate northwards along the east Australian coast, it has not been established that those waters are the sole destination. Dawbin and Falla (1949) suggested that the Chesterfield Reefs, northwest of New Caledonia in the eastern Coral Sea, were the destination of the east Australian stock as Humpback Whales had been captured there in the nineteenth century (Townsend, 1935). However, the "Discovery" tag program failed to establish evidence of such a pathway and the present situation with regard to Humpback Whale migration in the Coral Sea east of the Great Barrier Reef remains unresolved.

Paterson and Paterson (1989) considered that the east Australian Humpback Whale stock was increasing at approximately 9.7% per annum on the basis of annual surveys at Point Lookout during 1981–87. The 1987/88 and 1988/89 data were consistent with that estimate but the low increase demonstrated in 1989/90 was almost certainly due to the "late" northern migration in 1990 (Fig.4). Such a variation notwithstanding, the evidence from Table 2 indicates that the east Australian portion of the Area V stock has doubled since the cessation of whaling in 1962 and now exceeds 10% of the pre- exploitation estimate of 10,000.

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LITERATURE CITED

ANONYMOUS 1948. Whaling is big business. Fisheries Newsletter. 7(2): 2–3.

ANONYMOUS 1976. Moreton Island environment impact study and strategic plan. Co-ordinator General's Department, Brisbane, Queensland, 104p.

BRYDEN, M.M. 1985. Studies of Humpback Whales (*Megaptera novaeangliae*), Area V. 115–123. In J.K. Ling and M.M. Bryden, (eds), 'Studies of sea mammals in south latitudes'. (South Australian Museum: Adelaide).

CHAPMAN, D.G. 1974. Status of Antarctic rorqual stocks. 218–238. In W.E. Schevill, (ed.), 'The Whale problem, a status report'. (Harvard University Press: Cambridge, Mass.).

CHITTLEBOROUGH, R.G. 1965. Dynamics of two populations of the Humpback Whale, *Megaptera novaeangliae* (Borowski). Aust. J. Mar. Freshw. Res. 16: 33–128.

COLWELL, M. 1969. 'Whaling around Australia'. (Rigby: Adelaide) 168p.

DAKIN, W.J. 1934. 'Whalemen adventurers'. (Angus & Robertson: Sydney). 263p.

DAVIDSON, R. 1988. 'Whalemen of Twofold Bay'. (René Davidson: Eden), 172p.

DAWBIN, W.H. 1956. The migrations of Humpback Whales which pass the New Zealand coast. Trans. R. Soc. N.Z. 84: 147–196.

DAWBIN, W.H. 1964. Movements of Humpback Whales marked in the South West Pacific Ocean 1952 to 1962. Norsk Hvalfangst-Tidende 3: 68–78.

DAWBIN, W.H. 1966. The seasonal migratory cycle of Humpback Whales. 145–170. In K.S. Norris, (ed.), 'Whales, dolphins and porpoises'. (Univ. California Press: Berkeley and Los Angeles).

DAWBIN, W.H. AND FALLA, R.A. 1949. A contribution to the study of the Humpback Whale based on observations at New Zealand shore stations. Proc. 7th Pacific Sci. Congr. 4: 373–382.

ELLIS, R. 1989. Whales down under. Australian Geographic 16: 59–79.

KAUFMAN, G.D., SMULTEA, M.A. AND FORESTELL, P. 1987. Use of lateral body pigmentation patterns for photographic identification of East Australian (Area V) Humpback Whales. Cetus 7 (1): 5–13.

MACHIDA, S. 1974. The voyage of the Konan Maru No 16 to the Antarctic whaling grounds. Sci. Repts Whales Res. Inst. 26: 289–302.

OMURA, H. 1953. Biological study on the Humpback Whales in the Antarctic whaling Areas IV and V. Sci. Repts Whales Res. Inst. 8: 81–102.

PATERSON, R. 1980. Encouraging sightings of Humpback Whales off east coast. Australian Fisheries 39(4): 8–10.

PATERSON, R. 1981. 'Whale watch' brings encouraging reports. Australian Fisheries 40(4): 30–33.

PATERSON, R. 1983. 'Whale watch' brings more encouraging reports. Australian Fisheries 42(4): 32–33.

PATERSON, R. 1984. Migration patterns of Humpback Whales (*Megaptera novaeangliae*) in the waters adjacent to Moreton and North Stradbroke Islands. 342–347. In R.J. Coleman, J. Covacevich and P. Davie, (eds), 'Focus on Stradbroke'. (Boolarong, Brisbane).

PATERSON, R. 1987. Recovery in the East Australian Humpback Whale stock. Australian Fisheries 46(8): 32–36.

PATERSON, R. AND PATERSON, P. 1984. A study of the past and present status of Humpback Whales in East Australian waters. Biological Conservation 29: 321–343.

PATERSON, R. AND PATERSON, P. 1989. The status of the recovering stock of Humpback Whales *Megaptera novaeangliae* in East Australian waters. Biological Conservation 47: 33–48.

ROBINS, J.P. 1955. Whale marking and its uses . Fisheries Newsletter 14(4): 15,19.

SIMMONS, M.L. AND MARSH, H. 1986. Sightings of Humpback Whales in Great Barrier Reef waters. Sci. Repts Whales Res. Inst. 37: 31–46.

SLIJPER, E.J. 1962. 'Whales'. (Hutchinson:London). 475p.

TØNNESSEN, J.N. AND JOHNSEN, A.O. 1982. 'The history of modern whaling'. (Hurst and ANU Press: London and Canberra), 798p.

TOWNSEND, C.H. 1935. The distribution of certain whales as shown by log book records of American whaleships. Zoologica 19: 1–50.